VEHICULAR POWERED TRACKS

Inventor: Halley Ray Moor, JR., Hankamer, TX (US)

Correspondence Address:
C. DALE QUISENBERRY
POLASEK, QUISENBERRY & ERRINGTON, LLP.
6750 West Loop South, Suite 920
Bellaire, TX 77401 (US)

Appl. No.: 10/365,859
Filed: Feb. 13, 2003

Publication Classification

Int. Cl. 7 ........................................ B62D 55/00
U.S. Cl. ........................................... 180/9.44

ABSTRACT

A vehicular driven track apparatus is provided that may include a left track assembly and a right track assembly. Each track assembly may include a drive member. At least one roller member may be in mechanical communication with the left and right drive members. A left steering pad may be operatively connected to the left drive member to control movement thereof, and a right steering pad may be operatively connected to the right drive member to control movement thereof. A left brake or motor may be operatively connected to the left steering pad and disposed to control transfer of rotational movement from the at least one roller member to the left drive member. A right brake or motor may be operatively connected to the right steering pad and disposed to control transfer of rotational movement from the at least one roller member to the right drive member. The left and right steering pads may be adapted to interact with a left and right front wheel of a vehicle such that the apparatus may be steered from inside the vehicle by turning the front wheels to turn the steering pads to control movement of the left and right drive members.
VEHICULAR POWERED TRACKS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a track apparatus that may be powered by a vehicle, and more specifically to a vehicle powered track apparatus that may be steered by turning the front wheels of the vehicle.

[0003] 2. Description of the Related Art

[0004] It is not unusual for a vehicle—whether it be a car, truck, van, four-wheeler, etc.—to encounter terrain that cannot be navigated without becoming stuck. This may happen in a variety of environments and circumstances, such as by those in the construction industry, by farmers, off-road enthusiasts, or by hunters, just to name a few. For example, the terrain may be very wet, muddy, and/or uneven, or it may be covered in deep snow. The present invention is applicable and useful in situations where a vehicle would become stuck if driven into these or other types of terrain. Briefly, the present invention is directed to a track apparatus upon which the vehicle can be driven and then engaged with the vehicle.

The track apparatus is then powered and steered by the vehicle. As will be seen below, once engaged with the track apparatus, the vehicle will be equipped to navigate terrain far more demanding than the vehicle could navigate by itself. Other features, aspects and advantages of the present invention will become apparent from the following discussion.

SUMMARY OF THE INVENTION

[0005] In one aspect, the present invention may be a vehicular powered track apparatus comprising: a left track assembly and a right track assembly, the left track assembly having a left drive member, and the right track assembly having a right drive member; a drive axle connected between the left and right drive members; at least one roller member, disposed for rotatable engagement with a drive wheel of a vehicle, and connected to a gear drive; a drive shaft connected between the gear drive and the drive axle, whereby movement of the drive wheel causes the at least one roller member to rotate, thereby causing the gear drive to rotate the drive shaft, thereby causing the drive axle to rotate the left and right drive members; a left rotatable steering pad disposed for contact with a front left wheel of the vehicle, and a right rotatable steering pad disposed for contact with a front right wheel of the vehicle; and a left brake adapted to restrict transfer of rotational movement from the drive axle to the left drive member upon actuation of the left brake, and a right brake adapted to restrict transfer of rotational movement from the drive axle to the right drive member upon actuation of the right brake, the left brake being operatively connected to the left steering pad, and the right brake being operatively connected to the right steering pad, whereby the apparatus is steered by using a steering wheel in the vehicle to turn the left and right front wheels to turn the left and right steering pads to actuate the left and right brakes. Another feature of this aspect of the invention may be that each drive member is a sprocket. Another feature of this aspect of the invention may be that the left and right brakes are located within a housing of the drive axle.

Another feature of this aspect of the invention may be that the at least one roller member comprises a left roller member and a right roller member. Another feature of this aspect of the invention may be that the invention may further include a left bridge member disposed between the left steering pad and the left roller member, and a right bridge member disposed between the right steering pad and the right roller member. Another feature of this aspect of the invention may be that the at least one roller member comprises a single roller. Another feature of this aspect of the invention may be that the at least one roller member comprises a belt connected around at least two rollers, one of which is connected to the gear drive. Another feature of this aspect of the invention may be that the drive axle is directly coupled to the left and right drive members. Another feature of this aspect of the invention may be that the drive axle is indirectly connected to the left and right drive members. Another feature of this aspect of the invention may be that the apparatus may include a left axle shaft connected between the drive axle and the left drive member, and a right axle shaft connected between the drive axle and the right drive member. Another feature of this aspect of the invention may be that the left brake is connected between the left axle shaft and the left drive member, and the right brake is connected between the right axle shaft and the right drive member. Another feature of this aspect of the invention may be that the left brake is connected between the left drive member and the drive axle, and the right brake is connected between the right drive member and the drive axle. Another feature of this aspect of the invention may be that the left brake fluid actuator is connected between the left drive member and the drive axle, and the right brake fluid actuator operatively engaged with the right steering pad, and the right brake fluid actuator operatively connected to the right drive member. Another feature of this aspect of the invention may be that each of the left and right brake fluid actuators includes a piston having a plunger extending therefrom, the plunger of the left brake fluid actuator engaged with a left arm on the steering pad, and the plunger of the right brake fluid actuator engaged with a right arm on the steering pad. Another feature of this aspect of the invention may be that the steering pads are located between the drive axle and the at least one roller member. Another feature of this aspect of the invention may be that the steering pads are...
located forward of the drive axle. Another feature of this aspect of the invention may be that each steering pad includes a tire trough. Another feature of this aspect of the invention may be that the left steering pad is positioned substantially directly above the left track assembly, the right steering pad is positioned substantially directly above the right track assembly, the at least one roller member is positioned substantially directly above one of the left and right track assemblies, and the drive axle extends above the left and right track assemblies and is coupled to the left and right drive members from exterior sides of the left and right track assemblies, respectively. Another feature of this aspect of the invention may be that each of the left and right track assemblies further includes a pontoon.

[0006] In another aspect, the present invention may be a vehicular powered track apparatus comprising: a left track assembly and a right track assembly, the left track assembly having a left drive member, and the right track assembly having a right drive member; a left motor connected to the left drive member, and a right motor connected to the right drive member, at least one roller member disposed for rotatable engagement with a drive wheel of a vehicle; a left rotatable steering pad disposed for contact with a front left wheel of a vehicle, and a right rotatable steering pad disposed for contact with a front right wheel of the vehicle; a power generator connected to and actuated by the at least one roller member and in communication with the left and right motors; and a left control device in communication with the left motor and the power generator, and a right control device in communication with the right motor and the power generator, the left control device being operatively connected to the left steering pad, and the right control device being operatively connected to the right steering pad, wherein the apparatus is steered by using a steering wheel in the vehicle to turn the left and right front wheels to turn the left and right steering pads to control the left and right motors. Another feature of this aspect of the invention may be that each of the motors is a hydraulic motor, the left control device is a left valve, the right control device is a right valve, and the power generator is a hydraulic pump.

Another feature of this aspect of the invention may be that the apparatus may further include a return conduit connected between the pump and the left and right motors, a left high pressure conduit connected between the pump and the left valve, a right high pressure conduit connected between the pump and the right valve, a left forward conduit connected between the left valve and the left motor, a right reverse conduit connected between the left valve and the left motor, a right forward conduit connected between the right valve and the right motor, a right reverse conduit connected between the right valve and the right motor, and wherein the left valve includes a left valve control device connected to the left steering pad and having at least a forward position and a reverse position, and the right valve includes a right valve control member connected to the right steering pad and having at least a forward position and a reverse position. Another feature of this aspect of the invention may be that each of the conduits is a hydraulic hose. Another feature of this aspect of the invention may be that the at least one roller member comprises a roller member connected to the power generator, at least three idler rollers, and a drive belt disposed around the roller member and the idler rollers, the drive belt being sufficiently wide to receive both rear wheels of the vehicle. Another feature of this aspect of the invention may be that the at least one roller member comprises a left roller member and a right roller member, and further including a gear drive connected between the left and right roller members and connected to the power generator. Another feature of this aspect of the invention may be that the apparatus may further include a left bridge member mounted to the frame between the left steering pad and the left roller member, and a right bridge member mounted to the frame between the right steering pad and the right roller member. Another feature of this aspect of the invention may be that the at least one roller member comprises a single roller. Another feature of this aspect of the invention may be that the at least one roller member comprises a belt connected around at least two rollers, one of which is connected to the power generator. Another feature of this aspect of the invention may be that the apparatus may further include a left steering connector connected between the left steering pad and the left control device, and a right steering connector connected between the right steering pad and the right control device. Another feature of this aspect of the invention may be that each of the left and right steering connectors is a cable. Another feature of this aspect of the invention may be that each of the left and right track assemblies further includes a pontoon.

[0007] In another aspect, the present invention may be a vehicular powered track apparatus comprising: a left track assembly and a right track assembly, the left track assembly having a left drive member, and the right track assembly having a right drive member; at least one roller member in mechanical communication with the left and right drive members; and a left steering pad operatively connected to the left drive member to control movement thereof, and a right steering pad operatively connected to the right drive member to control movement thereof. Another feature of this aspect of the invention may be that the apparatus may further include a left brake operatively connected to the left steering pad and disposed to restrict transfer of rotational movement from the at least one roller member to the left drive member, and a right brake operatively connected to the right steering pad and disposed to restrict transfer of rotational movement from the at least one roller member to the right drive member. Another feature of this aspect of the invention may be that the apparatus may further include a left motor operatively connected to the left steering pad and disposed to control transfer of rotational movement from the at least one roller member to the left drive member, and a right brake operatively connected to the right steering pad and disposed to control transfer of rotational movement from the at least one roller member to the right drive member.

[0008] Other features and aspects of the present invention will be explained below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a top view of a specific embodiment of the vehicle powered track apparatus of the present invention.

[0010] FIG. 2 is a side view of the track apparatus shown in FIG. 1, shown with a vehicle in phantom lines positioned thereon.

[0011] FIG. 3 is an end view taken from the rear of the apparatus as shown in FIG. 2.
FIG. 4 is a side view of the apparatus as shown in FIG. 1, shown in partial cross-section taken along line 4-4.

FIG. 5 is a side view in partial cross-section similar to FIG. 4, except that this view illustrates the apparatus with a single roller member in contact with the rear drive wheel of the vehicle as opposed to the belt disposed about multiple rollers shown in FIGS. 1-4.

FIG. 6 is a perspective view showing an alternative arrangement for a brake in relation to a drive axle and steering pad.

FIG. 7 is a perspective view of an alternative arrangement for the braking and steering feature of a specific embodiment of the present invention.

FIG. 7A is a perspective view similar to FIG. 7 but showing the brake positioned in a different location.

FIG. 8 is a top view of another alternative arrangement for the braking and steering feature of the present invention, this embodiment being directed to a brake fluid actuator and a fluid-actuated brake.

FIG. 9 is a top view of an alternative embodiment of the track apparatus of the present invention.

FIG. 10 is an end view from the rear of the apparatus showing an alternative embodiment of the present invention.

FIG. 11 is an end view similar to FIG. 10, only FIG. 11 is an end view of the front of the alternative embodiment of the apparatus shown in FIG. 11.

FIG. 12 is a top view of another embodiment of the apparatus of the present invention, this one using hydraulic motors as opposed to mechanical brakes to steer the apparatus.

FIG. 13 is top view of yet another embodiment of the apparatus of the present invention, this one being similar to the apparatus shown in FIG. 12, with a main difference being that the embodiment of FIG. 13 is shown with a single belt that may span most of the width of the apparatus such that both rear tires of the vehicle may rest thereon.

FIG. 14 is a perspective view showing an alternative embodiment of a track assembly of the present invention, this one including a pontoon to enable the apparatus to float.

While the invention will be described in connection with the preferred embodiment, it will be understood that it is not intended to limit the invention to those embodiments. On the contrary, it is intended to cover all alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings in detail, wherein like numerals denote identical elements throughout the several views, there is shown in FIG. 1 a top view of a specific embodiment of a vehicular driven track apparatus 10 constructed in accordance with the present invention. In a specific embodiment, the track apparatus 10 may include a left track assembly 12 and a right track assembly 14. As shown in FIG. 2, which is a side view of the apparatus 10 as shown in FIG. 1 but shown with a vehicle 16 mounted thereon in phantom lines, each track assembly 14 may be of any type of track assembly known in the art, and may include a drive member 18 (e.g., a sprocket), a number of idler members 20, and a continuous traction belt 21 disposed therearound. Referring again to FIG. 1, the left and right track assemblies 12 and 14 may be connected to a frame 22. The apparatus 10 may further include a drive axle 24 connected, either directly or indirectly, to each of the drive members 18 of the left and right track assemblies 12 and 14. In a specific embodiment, the drive axle 24 may be connected to the drive members 18 of the left and right track assemblies 12 and 14 through a left axle shaft 24a and a right axle shaft 24b, respectively. Each axle shaft 24a and 24b may include a U-joint 25 at each end thereof for connecting the axle shafts 24a and 24b between the drive axle 24 and the drive members 18. The drive axle 24 may be of any type known to those of skill in the art. In a specific embodiment, the drive axle 24 may be of the type that includes a left brake 26 and a right brake 28, each of which is shown in phantom as being mounted within the drive axle 24. The left brake 26 may include an actuator member 30 and the right brake 28 may include an actuator member 32.

The invention is not limited to any particular type of brake but is intended to encompass all types of brakes known to those of ordinary skill in the art, including but not limited to disc brakes, drum brakes, power brakes, etc. Similarly, the scope of the invention is not limited to the specific location of the brakes, other than to have one located on each side of the apparatus 10 and be mechanically connected, whether directly or indirectly, to the corresponding drive member 18 of the track assemblies 12 and 14, so as to restrict the transfer of rotational movement from the drive axle 24 to the drive members 18 upon actuation of the corresponding brake. For example, in specific embodiments as shown in FIGS. 6 and 11, the brakes may be separate from the drive axle 24 and coupled proximate the drive members 18.

Referring again to FIG. 1, the apparatus 10 may further include a left steering connector 34 connected between the actuator member 30 of the left brake 26 and a left steering pad 38. The apparatus 10 may further include a right steering connector 36 connected between the actuator member 32 of the right brake 28 and a right steering pad 40. In a specific embodiment, the left and right steering connectors 34 and 36 may each be a cable. As shown in FIG. 4, which is a cross-sectional side view taken along line 4-4 of FIG. 1, each steering pad 38 and 40 is rotatably mounted to the frame 22, such as on a bearing member 39. As shown in FIGS. 1 and 4, in a specific embodiment, each steering pad 38 and 40 may include a tire trough 42/44 adapted to receive a front left tire 46 and a front right tire 47 (see FIG. 11), respectively, of the vehicle 16. As more fully explained below, the apparatus 10 may be steered from inside the vehicle 16 by turning the front tires of the vehicle 16.

As shown in FIG. 1, the apparatus 10 may further include a transmission 48 which may include a gear shift member 49. In a specific embodiment, the transmission 48 may be connected to the drive axle 24 in any manner known to those of skill in the art. The apparatus 10 may further include a drive shaft 50 connected between the transmission
and a gear drive 52, which may be located towards the rear of the apparatus 10. It will be understood that the apparatus 10 may be provided without a transmission 24, in which case the drive shaft 50 would be connected to the drive axle 24. In a specific embodiment, the gear drive 52 may be of the type found in the rear end of any car or truck. A left side of the gear drive 52 may be connected to a left roller member 54, and a right side of the gear drive 52 may be connected to a right roller member 56. The left and right roller members 54 and 56 are connected to the frame 22. In a specific embodiment, the left and right roller members 54 and 56 may each be a single roller, as shown in FIG. 5. In the embodiment of FIG. 5, the apparatus 10 may include a left rear bridge 73 and a right rear bridge. In another specific embodiment, as shown in FIGS. 1, 2, 4, and 6, the left and right roller members 54 and 56 may include a number of rollers 58, one (on each side of the apparatus 10) of which may be connected to the gear drive 52. In this embodiment, the left and right roller members 54 and 56 may further include a left belt 60 and a right belt 62 (see, e.g., FIGS. 2 and 3). The left and right roller members 54 and 56 are adapted for engagement with left and right rear drive wheels 64 and 66 (see FIG. 3) of the vehicle 16. By providing the apparatus 10 with the belt-drive roller members 54 and 56 as shown in FIGS. 1-4, as opposed to a single roller as shown in FIG. 5, the apparatus 10 is capable of being powered by many different vehicles having a variety of lengths and wheel bases without making any modifications to the apparatus 10.

The apparatus 10 may further include a left ramp 68 and a right ramp 70, as shown in FIG. 1, each of which may be hingedly attached to the frame 22 in a specific embodiment. As also shown in FIG. 1, the apparatus 10 may include a left bridge member 72 mounted to the frame 22 and positioned between the left steering pad 38 and the left roller member 54. Similarly, the apparatus 10 may include a right bridge member 74 mounted to the frame 22 and positioned between the right steering pad 40 and the right roller member 56.

In operation, the vehicle 16 is driven up the ramps 68 and 70 and over the left and right roller members 54 and 56 and the left and right bridge members 72 and 74 until the front tires of the vehicle 16 come to rest on the left and right steering pads 38 and 40 (such as in tire troubles 42 and 44), and the rear tires of the vehicle 16 come to rest on the left and right roller members 54 and 56. The vehicle 16 may then be secured to the apparatus 10 by, for example, front and/or rear vehicle connectors 76 and 78 (see FIG. 2). The driver of the vehicle 16 may then drive the apparatus 10 in the same manner as the vehicle 16 is driven. For example, the vehicle 16 is placed in gear, and the accelerator is depressed to cause the rear tires 64 and 66 to turn. This causes the roller members 54/56 to turn, which causes the gear drive 52 to turn, which causes the drive shaft 50 to turn, which causes the transmission 48 and drive axle 24 to turn, which causes the left and right track assemblies 12 and 14 to turn. If it is desired to turn the apparatus 10, the steering wheel (not shown) of the vehicle 16 is turned in the direction desired, and the apparatus 10 will turn in that direction. In this specific embodiment, the turning takes place through interaction of the steering pads 38 and 40 and the brake 26 and 28, as will now be explained in more detail.

If, for example, it is desired to turn to the left, then the steering wheel (not shown) of the vehicle 16 is turned to the left. This causes both steering pads 38 and 40 to rotate in a counterclockwise direction. This will cause the left steering connector 34 to shift the actuator member 30 on the left brake 26 so as to actuate the brake 26 and thereby prevent power from being transferred to the drive assembly 12. The connectors 34 and 36 are configured so that turning the steering pads 38 and 40 counterclockwise will actuate the left brake 26 but not the right brake 28, and turning the steering pads 38 and 40 clockwise will actuate the right brake 28 but not the left brake 26. In a specific embodiment, this may be accomplished by using cables as the connectors 34/36, and by connecting the left cable 34 to a point on the upper left (northwest) quadrant of the left steering pad 38 and by connecting the right cable 36 to a point on the upper right (northeast) quadrant of the right steering pad 40. In this manner, when the pads 38/40 are turned counterclockwise, the left cable 34 will pull the left brake actuator 30 to actuate the left brake 26, and the right cable 36 will become slack and not actuate the right brake 28. The same mode of operation holds true in reverse when the pads 38/40 are turned clockwise.

Another alternative braking arrangement similar to that shown in FIG. 6 is shown in FIG. 7, in which a left axle shaft 24a' is connected between the brake 26 and the drive axle 24', such as via U-joints 25'. The brake 26' includes a brake actuator 260' that is connected to the left steering pad 38 by a left steering connector 34. The brake 26' may further include an output shaft 27' connected to a first gear 80 that is meshed with an optional second gear 82. The gear 80 and, if provided, the gear 82 may be part of the left track assembly 12 (FIG. 1). In a specific embodiment, the first gear 80 or the second gear 82 may comprise the drive member 18 in the track assembly 12 or 14. Alternatively, the second gear 82 may be coupled to the drive member 18 in a manner known to those of skill in the art. It will be understood that the configuration depicted in FIG. 7 is also provided on the right side of the apparatus. A variation of the embodiment shown in FIG. 7 is shown in FIG. 7a, in which the left brake 26" is connected between the drive axle 24" and the left axle shaft 24a", and the left axle shaft 24a" is connected to the gear 80.

As mentioned above, the present invention is not limited to use with any particular type of brake. In another embodiment, as shown in FIG. 8, the track apparatus may be provided with a fluid-actuated brake 26" that may be positioned in any of the positions in relation to the drive axle 24 discussed above in connection with any of the other embodiments. In this embodiment, the left steering pad 38 may include an arm 84 adapted for engagement with a brake fluid actuator 86 of any type known to those of skill in the
In a specific embodiment, as shown in FIG. 8, the brake fluid actuator 86 may include a piston 88 sealably disposed for movement within the actuator 86. The piston 88 may include a plunger 90 extending therefrom and adapted for engagement with the arm 84 on the left steering pad 38. A fluid conduit 90 (such as a hose) is connected between the actuator 86 and the brake 26" such that movement of the piston 88 will operate to apply and withdraw pressurized fluid to and from the brake 26". In this manner, as known to those skilled in the art, the brake 26" will be actuated upon application of pressurized fluid thereto so as to apply a braking force to the left track assembly 12. In like manner, braking force will be removed from the left track assembly 12 upon withdrawal of pressurized fluid from the brake 26".

In operation, when it is desired to turn the track apparatus to the left, the front tires of the vehicle 16 will be turned to the left (recall discussion in relation to FIGS. 1-3), which will cause the arm 84 on the left steering pad 38 to move the plunger 90, which will move the piston 88, which will actuate the brake 26" in the manner discussed above and thereby apply a braking force to the left track assembly 12. This will cause the apparatus to turn to the left under the force of the right track assembly 14, in the same manner as with the previously-discussed embodiments. It will be understood that the configuration depicted in FIG. 8 may also be provided on the right side of the apparatus.

Referring now to FIG. 9, which shows another specific embodiment of the track apparatus of the invention, the steering pads 38 and 40 may be positioned forward of the drive axle 24. In this embodiment, the left steering connector 34 may be connected to the right side of the left steering pad 38, and the right steering connector 36 may be connected to the left side of the right steering pad 40. Another difference in this embodiment is that, instead of a single drive shaft 50 extending from the drive axle 24 or transmission 48 to the gear drive 52, as in FIG. 1, the apparatus 10 may be provided with a transmission 48 disposed approximately equidistant between the drive axle 24 and the gear drive 52. In this embodiment, the apparatus 10 may further be provided with a forward drive shaft 51a connected between the drive axle 24 and the transmission 48, and a rear drive shaft 51b connected between the transmission 48 and the gear drive 52. This embodiment further illustrates that, in a specific embodiment, the bridges 72 and 74 may be longer than the bridges 72 and 74 in FIG. 1, and the roller members 54 and 56 may be shorter than the roller members 54 and 56 in FIG. 1. The mode of operation and the other structural components of this embodiment are essentially the same as shown in FIG. 1.

In another embodiment, as shown in FIGS. 10 and 11, the apparatus 10 may be configured so that the tires of the vehicle 16, the left and right steering pads 38 and 40, and the left and right roller members 54 and 56 are positioned substantially directly above the left and right track assemblies 12 and 14, respectively. The structure and operation of this embodiment is very similar to the structure and operation of the embodiments shown in FIGS. 1 and 9, with the key difference being that rotational power from the drive axle 24 is delivered to the track assemblies 12 and 14 from the exterior sides of the track assemblies 12 and 14 as opposed to from their interior sides, as with the previously-discussed embodiments. As best shown in FIG. 11, this is accomplished by extending opposed ends of the drive axle 24 above the left and right track assemblies 12 and 14 and connecting the left end of the drive axle 24 to a first left gear 94 and connecting the right end of the drive axle 24 to a first right gear 96. The first left gear 94 is coupled to a second left gear 98, which in turn is coupled to the drive member 18a on the left track assembly 12. Similarly, the first right gear 96 is coupled to a second right gear 100, which in turn is coupled to the drive member 18b on the right track assembly 14. A left brake 26 is provided on the left side of the apparatus 10", and a right brake 28 is provided on the right side of the apparatus 10". The brakes 26 and 28 may be located in any position discussed above in relation to the drive axle 24. In a specific embodiment, as shown in FIG. 11, the brakes 26 and 28 may be located proximate the first left gear 94 and first right gear 96, respectively. The brakes 26 and 28 are connected to and controlled by movement of the left and right steering pads 38 and 40 in the same manner as discussed above in connection with previously-discussed embodiments of the present invention.

Referring now to FIG. 12, which illustrates another embodiment of the present invention, there is shown a track apparatus 10" that uses the left and right steering pads 38 and 40 to control a left and a right hydraulic motor 102 and 104, respectively, as opposed to controlling brakes as in the previously-discussed embodiments. The left motor 102 may include a left output shaft 103 that is connected to the left drive member 18a in the left track assembly 12. The right motor 104 may include a right output shaft 105 that may be connected through a final drive 126 to the right drive member 18b in the right track assembly 14. If desired, the left side of the apparatus 10" may also include a final drive gear between the left motor 102 and the left drive member 18a.

The embodiment of FIG. 12 does not include a drive axle 24 or a drive shaft 50 like the previously-discussed embodiments. Rather, the apparatus 10" includes a power generator 106, such as a hydraulic oil pump, that is coupled to the gear drive 52. The power generator 106 may be a hydraulic pump of the type having a fluid reservoir, as will be understood by those of skill in the art. The manner in which the gear drive 52 is actuated through the roller members 54 and 56 (and the structure of the roller members 54 and 56) may be as in any of the previously-discussed embodiments. It will be understood that the output of the gear drive 52 powers the power generator 106. In a specific embodiment in which the power generator 106 is a hydraulic pump, the pump 106 may include two high pressure outlet ports, one connected to a high pressure conduits 108 and the other connected to a high pressure conduit 110. The pump 106 may also include a return fluid port that is connected to a return conduit 112. The return conduit 112 is connected to a return fluid port on the left motor 102 and to a return fluid port on the right motor 104. The left high pressure conduit 108 is connected between the pump 106 and a left control device 114, such as a valve. The right high pressure conduit 110 is connected between the pump 106 and a right control device 116, such as a valve. A left forward conduit 118 is connected between the left control device 114 and the left motor 102, and a left reverse conduit 120 is connected between the left control device 114 and the left motor 102. A right forward conduit 122 is connected between the right control device 116 and the right motor 104, and a right reverse conduit 124 is connected between the right control device 116 and the right motor 104. In a
specific embodiment, the conduits 108, 110, 112, 118, 120, 122, and 124 may each be a hydraulic hose, or, in another specific embodiment may each singly or in combination be a communication link of any type that is capable of being used to communicate signals of any type between the power generator 106 and the motors 102 and 104. The left control device 114 may include a left actuator member 115, and the right control device 116 may include a right actuator member 117. Each actuator member 115 and 117 may include a “forward” position and a “reverse” position, as will be understood by those skilled in the art. The left actuator member 115 is connected to the left steering pad 38 by a connector 34, and the right actuator member 117 is connected to the right steering pad 40 by a connector 36. The actuators 115 and 117 are connected to the steering pads 38 and 40 in such a way that the actuators 115 and 117 are in their “forward” positions when the steering pads 38 and 40 are positioned with the tire treads 42 and 44 pointing straight ahead (i.e., parallel to the track assemblies 12 and 14). Similar to the manner in which the brakes of the previously-discussed embodiments are controlled by the steering pads 38 and 40, the steering pads 38 and 40 in this embodiment are adapted to operate the left and right control devices 114 and 116. The manner of operation of the embodiment of FIG. 12 will now be explained.

In operating the embodiment of FIG. 12, the vehicle 16 is driven up onto and positioned on the apparatus 10" in the same manner as discussed above, with the vehicle’s rear tires on the roller members 54 and 56, and the vehicle’s front tires on the steering pads 38 and 40. When the rear wheels start turning, the gear drive 52 will start turning, which will actuate the pump 106. This will cause pressurized fluid to start flowing out of the pump 106 through the left and right high pressure conduits 108 and 110 and to the left and right control devices (e.g., valves) 114 and 116, respectively. So long as the vehicle’s tires are pointing straight ahead, so that the steering pads 38 and 40 have not been turned but are also pointing straight ahead, the actuator members 115 and 117 will remain in their “forward” positions, which will allow the pressurized fluid to pass through the motors 102 and 104 and through the return conduit 112 to the pump 106. With pressurized fluid flowing through the motors 102 and 104, the output shafts 103 and 105 and drive members 18 will turn and drive the track assemblies 12 and 14 forward. If it is desired to turn to the left, for example, the vehicle’s front tires will be turned to the left, which will rotate the steering pads 38 and 40 to the left. This will cause the right steering pad connector 36 to go slack (in an embodiment where it is a cable), and the left steering pad connector 34 to shift the left actuator member 115 from its “forward” position to its “reverse” position. This will cause the left motor 102 to either lock and not turn at all or start turning in an opposite direction, so as to cause the shaft 103 and drive member 18a to rotate in a reverse direction. In this latter instance, it will be understood that the apparatus 10" will basically pivot about its center point, as the right track assembly 14 will be going forward at the same time the left track assembly 12 is going backward. When the tires are straightened up, the left actuator member 115 will be shifted back to its “forward” position and the track apparatus 10" will continue moving in the forward direction. It is noted that the present invention is not limited to any particular type of motor 102 or 104 or power generator 106.

FIG. 13 illustrates another embodiment of the present invention, which is similar to the embodiment disclosed in FIG. 12, except that the embodiment of FIG. 13 does not include a gear drive 52 to transfer power to the pump 106. Instead, in this embodiment, the pump 106 is coupled directly to and driven by a roller member 128. In this embodiment, a drive belt 130 may be disposed around the roller member 128 and a number of idlers (such as idlers 58 of the embodiment shown in FIG. 4). In a specific embodiment, the drive belt 130 may be sufficiently wide to receive both rear wheels of the vehicle 16 (not shown in FIG. 13). The remaining components of this embodiment and the manner in which they operate are substantially as set forth above in connection with FIG. 12.

In another specific embodiment, the track assemblies 12 and 14 of the present invention may be provided with a pontoon 132, as shown in FIG. 14. In this manner, the track apparatus of the present invention may be adapted to float, so as to enable the apparatus to ferry the vehicle 16 across a body of water.

It is to be understood that the invention is not limited to the exact details of construction, operation, exact materials or embodiments shown and described, as obvious modifications and equivalents will be apparent to one skilled in the art. For example, the scope of the invention is not intended to be limited to any particular type of track assembly 12 or 14, drive axle 24, brake 26, transmission 48, gear drive 52, hydraulic motor 102 or 104, power generator 106, or control device 114 or 116. Accordingly, the invention is therefore to be limited only by the scope of the appended claims.

1. A vehicular powered track apparatus comprising:
   a left track assembly and a right track assembly, the left track assembly having a left drive member, and the right track assembly having a right drive member;
   a drive axle connected between the left and right drive members;
   at least one roller member, disposed for rotatable engagement with a drive wheel of a vehicle, and connected to a gear drive;
   a shaft connected between the gear drive and the drive axle, whereby movement of the drive wheel causes the at least one roller member to rotate, thereby causing the gear drive to rotate the drive shaft, thereby causing the drive axle to rotate the left and right drive members;
   a left rotatable steering pad disposed for contact with a front left wheel of the vehicle, and a right rotatable steering pad disposed for contact with a front right wheel of the vehicle; and
   a left brake adapted to restrict transfer of rotational movement from the drive axle to the left drive member upon actuation of the left brake, and a right brake adapted to restrict transfer of rotational movement from the drive axle to the right drive member upon actuation of the right brake, the left brake being operatively connected to the left steering pad, and the right brake being operatively connected to the right steering pad, whereby the apparatus is steered by using a steering
wheel in the vehicle to turn the left and right front wheels to turn the left and right steering pads to actuate the left and right brakes.

2. The apparatus of claim 1, wherein each drive member is a sprocket.

3. The apparatus of claim 1, wherein the left and right brakes are located within a housing of the drive axle.

4. The apparatus of claim 1, wherein the at least one roller member comprises a left roller member and a right roller member.

5. The apparatus of claim 4, further including a left bridge member disposed between the left steering pad and the left roller member, and a right bridge member disposed between the right steering pad and the right roller member.

6. The apparatus of claim 1, wherein the at least one roller member comprises a single roller.

7. The apparatus of claim 1, wherein the at least one roller member comprises a belt connected around at least two rollers, one of which is connected to the gear drive.

8. The apparatus of claim 1, wherein the drive axle is directly coupled to the left and right drive members.

9. The apparatus of claim 1, wherein the drive axle is indirectly connected to the left and right drive members.

10. The apparatus of claim 1, further including a left axle shaft connected between the drive axle and the left drive member, and a right axle shaft connected between the drive axle and the right drive member.

11. The apparatus of claim 10, wherein the left brake is connected between the left axle shaft and the left drive member, and the right brake is connected between the right axle shaft and the right drive member.

12. The apparatus of claim 10, wherein the left brake is connected between the left axle shaft and the drive axle, and the right brake is connected between the right axle shaft and the drive axle.

13. The apparatus of claim 1, wherein the left brake is connected between the left drive member and the drive axle, and the right brake is connected between the right drive member and the drive axle.

14. The apparatus of claim 1, further including a left steering connector connected between the left steering pad and a left brake actuator member on the left brake, and a right steering connector connected between the right steering pad and a right brake actuator member on the right brake.

15. The apparatus of claim 14, wherein each of the left and right steering connectors is a cable.

16. The apparatus of claim 1, wherein each of the left and right brakes is a fluid-actuated brake, and further including a left brake fluid conduit connected between the left fluid-actuated brake and a left brake fluid actuator operatively engaged with the left steering pad, and a right brake fluid conduit connected between the right fluid-actuated brake and a right brake fluid actuator operatively engaged with the right steering pad.

17. The apparatus of claim 16, wherein each of the left and right brake fluid actuators includes a piston having a plunger extending therefrom, the plunger of the left brake fluid actuator engaged with a left arm on the left steering pad, and the plunger of the right brake fluid actuator engaged with a right arm on the right steering pad.

18. The apparatus of claim 1, further including a transmission connected between the gear drive and the drive axle.

19. The apparatus of claim 18, wherein the transmission is connected to the drive axle.

20. The apparatus of claim 18, further including a forward drive shaft connected between the transmission and the drive axle, and a rear drive shaft connected between the transmission and the gear box.

21. The apparatus of claim 1, wherein the steering pads are located between the drive axle and the at least one roller member.

22. The apparatus of claim 1, wherein the steering pads are located forward of the drive axle.

23. The apparatus of claim 1, wherein each steering pad includes a tire trough.

24. The apparatus of claim 1, wherein the left steering pad is positioned substantially directly above the left track assembly, the right steering pad is positioned substantially directly above the right track assembly, the at least one roller member is positioned substantially directly above one of the left and right track assemblies, and the drive axle extends above the left and right track assemblies and is coupled to the left and right drive members from exterior sides of the left and right track assemblies, respectively.

25. The apparatus of claim 1, wherein each of the left and right track assemblies further includes a pontoon.

26. A vehicular powered track apparatus comprising:

   a left track assembly and a right track assembly, the left track assembly having a left drive member, and the right track assembly having a right drive member;

   a left motor connected to the left drive member, and a right motor connected to the right drive member;

   at least one roller member disposed for rotatable engagement with a drive wheel of a vehicle;

   a left rotatable steering pad disposed for contact with a front left wheel of a vehicle, and a right rotatable steering pad disposed for contact with a front right wheel of the vehicle;

   a power generator connected to and actuated by the at least one roller member and in communication with the left and right motors; and

   a left control device in communication with the left motor and the power generator, and a right control device in communication with the right motor and the power generator.

   The left control device being operatively connected to the left steering pad, and the right control device being operatively connected to the right steering pad, whereby the apparatus is steered by using a steering wheel in the vehicle to turn the left and right front wheels to turn the left and right steering pads to control the left and right motors.

27. The apparatus of claim 26, wherein each of the motors is a hydraulic motor, the left control device is a left valve, the right control device is a right valve, and the power generator is a hydraulic pump.

28. The apparatus of claim 27, further including a return conduit connected between the pump and the left and right motors, a left high pressure conduit connected between the pump and the left valve, a right high pressure conduit connected between the pump and the right valve, a left forward conduit connected between the left valve and the left motor, a left reverse conduit connected between the left valve and the left motor, a right forward conduit connected between the right valve and the right motor, a right reverse conduit connected between the right valve and the right
motor, and wherein the left valve includes a left valve control member connected to the left steering pad and having at least a forward position and a reverse position, and the right valve includes a right valve control member connected to the right steering pad and having at least a forward position and a reverse position.

29. The apparatus of claim 28, wherein each of the conduits is a hydraulic hose.

30. The apparatus of claim 26, wherein the at least one roller member comprises a roller member connected to the power generator, at least three idler rollers, and a drive belt disposed around the roller member and the idler rollers, the drive belt being sufficiently wide to receive both rear wheels of the vehicle.

31. The apparatus of claim 26, wherein the at least one roller member comprises a left roller member and a right roller member, and further including a gear drive connected between the left and right roller members and connected to the power generator.

32. The apparatus of claim 31, further including a left bridge member mounted to the frame between the left steering pad and the left roller member, and a right bridge member mounted to the frame between the right steering pad and the right roller member.

33. The apparatus of claim 26, wherein the at least one roller member comprises a single roller.

34. The apparatus of claim 26, wherein the at least one roller member comprises a belt connected around at least two rollers, one of which is connected to the power generator.

35. The apparatus of claim 26, further including a left steering connector connected between the left steering pad and the left control device, and a right steering connector connected between the right steering pad and the right control device.

36. The apparatus of claim 35, wherein each of the left and right steering connectors is a cable.

37. The apparatus of claim 26, wherein each of the left and right track assemblies further includes a pontoon.

38. A vehicular powered track apparatus comprising:

- a left track assembly and a right track assembly, the left track assembly having a left drive member, and the right track assembly having a right drive member;
- at least one roller member in mechanical communication with the left and right drive members; and
- a left steering pad operatively connected to the left drive member to control movement thereof, and a right steering pad operatively connected to the right drive member to control movement thereof.

39. The apparatus of claim 38, further including a left brake operatively connected to the left steering pad and disposed to restrict transfer of rotational movement from the at least one roller member to the left drive member, and a right brake operatively connected to the right steering pad and disposed to restrict transfer of rotational movement from the at least one roller member to the right drive member.

40. The apparatus of claim 38, further including a left motor operatively connected to the left steering pad and disposed to control transfer of rotational movement from the at least one roller member to the left drive member, and a right brake operatively connected to the right steering pad and disposed to control transfer of rotational movement from the at least one roller member to the right drive member.

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